VI. *An Essay on Sponges, with Descriptions of all the Species that have been discovered on the Coast of Great Britain.*

By George Montagu, Esq; F. L. S. & M. W. S.

(Read 7th March 1812.*)*

Little has been added to the division of *Zoophyta* as British, since the time of that enlightened zoophytist Mr Ellis, to whom we are greatly indebted, not only for the discovery of numerous species of the several genera that constitute this class of animate beings, but for his critical investigation. By his indefatigable researches, microscopical inspection, and judicious dissection, he clearly demonstrated, that the subjects of this division (which had been considered as extremely ambiguous, from their general appearance bearing so much similitude to plants) are truly of *animal* origin. Many indeed, which appear to possess all the qualities of marine plants, such as roots [*], stem, branches, and vesicles bearing the young *in embryo*, like seeds, (as exemplified in *Sertularia,*) are formed for the support of an animal of a most complicated nature. These coverings, or more imperishable parts of *zoophytal* animals, grow in the same manner, and some perhaps draw in nourishment in a similar way, as *fuci* and *confervæ.* Like shells, however, they are constituent parts of an integral animal, expanding with it according to the laws of nature.

The subjects in *Zoophyta*, as in *Testacea*, when examined in the cabinet only, exhibit that part of the animal which is the least perishable; and of course, that, by which science has been best able to define, and reduce them to system, for the better ascertaining the distinction of the numerous species.

It is not, however, my intention to enter into a general history of the nature of *zoophytes* in this place; nor is it required; since nothing further is necessary for those who demand instruction in this abstruse science, than to peruse the works of our countryman Ellis. There are indeed some of the subjects which belong to this class of beings, that possess so small a share of apparent vitality, and are so indefinite in shape, that even that great illuminator in this science, could not define them: amongst these, *Alcyonium* and *Spongia* seem to rest nearly where they were left by Ellis. Of the former, if we were to confine the genus to an aggregate of polypes, enclosed within superficial cells, (which appears essential,) then several of the species of *Alcyonium* would be removed, particularly *lyncurium*, *cydonium*, *bursa*, and perhaps some others. In these three, no stellate pores or cells, nor polypes, have ever been observed.

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[*] Radical tubes, or ramifications resembling roots, by which they are affixed to other bodies.

Bursa is without doubt a *Conferva*. *Lyncurium* and *cydonium* approach very near to *Spongia*; but these, with two or three others of similar structure, might perhaps be formed into a new genus, if any advantage to science could be gained by it. However, till we are better acquainted with more of this intricate family, I shall arrange two or three of the same structure (which are perhaps new) in the genus *Spongia*, as bearing strong characters of such, according to the Ellisian definition.

The animals of this genus, the most inert and least definable by means of the animal itself, are extremely obscure; consequently it is not sufficient that such anomalous beings be described in half a dozen of words, which is all we have to direct us with respect to many species. In most instances, shape is not to be depended upon; and, as the greater part of the sponges we obtain, are thrown ashore by the sea after storms, few are found perfect. Those in which we are the least likely to err, are such as are branched, lobated, foliated, or digitated, or possess something like specific characters independent of texture; but, at the same time, texture must be a leading feature in discrimination, for, in the more compact sponges, destitute of ramifications or appendages, and where shape has no uniformity, texture alone must guide our opinion.

Under all the difficulties I have to encounter with respect to synonyma, I am induced to offer an essay on the British species of this intricate genus, for these reasons: 1*st*, Because I possess many that do not appear to have been described; 2*dly*, Because no British naturalist, since Ellis, has exclusively undertaken the subject; and, 3*dly*, Because it may pave the way to greater exertions in this occult science, by stimulating others to reap in the same field, and give their gleanings to the public.

If I fall into error with respect to synonymes, those who have studied the subject will readily excuse it, from their knowledge of the difficulty of avoiding it. If I fail in my endeavours to define all the British species of *Spongia*, I am sure of obtaining two desirable objects;—that of the pleasure and information the study and researches have afforded me; and also that of allowing the scientific to participate with me in the benefit of these researches, which some friends have urged me to publish.

It would appear that Mr Ellis found much difficulty in ascertaining the species of this genus. By him seven only seem to have been described, viz. *coronata*, *oculata*, *tomentosa*, *stuposa*, *cristata*, *palmata*, and *botryoides*. In addition to these, Berkenhout has given *dichotoma*; Mr Sowerby, in his British Miscellany, enumerates three others: *pulchella*, *cancellata*, and *compacta*; and, lastly, we find *infundibuliformis*, *ventilabrum*, and *compressa*, described as British by Professor Jameson in the first volume of the Memoirs of the Wernerian Society; making together fourteen species.

It will be noticed, that, in the following pages, I have almost twice that number; and of those which possess sufficiently strong specific characters to be defined by the pencil, figures have been given.

With respect to the nature of sponges, there has been considerable difference of opinion; but, in the present era of natural history, it is pretty generally allowed, that they are truly of an animal substance, extremely torpid, and for the most part, if not wholly, destitute of visible motion. With considerable attention to some species taken fresh from the sea, and others that I have examined in the cavities of their native rocks, still immersed in their natural element, not the smallest motion was perceptible, nor were there any appearances of internal action; for such would have produced some currents or slight agitation in the water, which must have been perceived by the assistance of glasses *. Action, however, is by no means necessary to constitute an animal; for in many instances vitality is known to exist without mobility.

Zoophytes in general are destitute of locomotion; and what action any of them possesses is very limited, being chiefly confined to the multifarious polypi that constitute them. The only genus of *Zoophyta* which is not possessed of polypes, is *Spongia;* and it is to be wished that this character should be continued in contradistinction to *Alcyonium,* which Mr Ellis established as the basis of separation in the two genera.

In the generic characters, Bosc has unfortunately omitted this essential distinction, as he has described both genera to be *polymorphous polypi,* which should imply that *spongia,* as well as *alcyonium,* is constituted by polypes. This is contrary to all experience, and indeed is in direct opposition to fact.

It is not necessary that an animal body should have motion to assure us of its animality, or that it sustains vitality; since life, in some of the lower order of beings, is so infinitely diffused and variously modified; at the same time that animal action is so extremely limited, as to create doubts of its existence *.

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* Mr Ellis speaks with certainty as to the contractive and expansive property of one species, the *cristata.*

The actual distinction between animal and vegetable life, is perhaps so small and indefinite, that the physiologist will scarcely venture to say where the one terminates, and the other commences: the only material distinction between them appears to consist in their constituent parts.

By chemical analysis, there appears to be an infallible character of specific distinction, by which they are with certainty recognised †. That character, therefore, discovered in all animal matter, has been proved by chemical decomposition to exist in sponges ‡. Motion, as already observed, is not essential to animality; and in their inertion, zoophytes, especially sponges, approximate so nearly to ve-

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* Vitality is not affected by separating any part of zoophytal animals, no more than in Hydra: each fraction contains an equal portion of vitality independent of connexion. In the higher order of beings, vitality is limited.

† "I need not," says Mr Ellis, when speaking of the chemical experiments on *keratophyta*, "mention any other to the curious, than the great quantity of volatile salts that may be extracted from them, and the strong smell they yield when burnt, of roasted oysters."

‡ The odour produced in the combustion of sponges, and other zoophytes, is similar to that of other animal substances, mixed with a peculiar marine odour, well exemplified by oysters roasted in their shells; and which is very different from the effluvia of burning vegetable matter.

getables, that it is only the peculiarity of their constituent parts (which we are enabled to discover by the aid of chemical science) that separates them. It is not essential to the formation and growth of animal substance, that a heart, brains, or even intestines, or any viscera, should exist, no more than it is, that all vegetables should possess roots.

Many species of *alcyonium* appear to be destitute of motion except in that part termed the polypi; and yet these only constitute a small proportion of this multifarious animal; for the basis from which these animated portions issue, is equally formed of the same material, also endued with the principle of animal life. Were it not for the multifarious polypi that constitute a part of *alcyonium*, the characters of distinction between that and *spongia*, would be more indefinite.

Whether motion has ever been discovered or not in any species of sponge, is not I conceive of so much importance as some naturalists would appear to consider. Those who are solicitous in their inquiries after the animals which they have supposed to construct the vesicular fabric of sponges, and have expressed their surprise, that in this age of cultivated science, no one should yet have discovered,—must have taken a very limited view of matter possessing vitality, and have grounded their hypothesis only upon supposed analogy. Why should it be concluded that sponges are only the *nidi* of insects or vermes; or why should not organic matter possessing vitality without action, exist? If these philosophers expect to find polypes, or vermes of any kind, to be the inhabitants of Sponges, they will be deceived. The true character of spongia, is that of a living, inactive, gelatinous flesh, supported by innumerable cartilaginous or corneous fibres or spicula, most commonly ramified or reticulated, and furnished more or less with external pores or small mouths, which absorb the water, and which is conveyed by an infinity of minute channels or capillary tubes throughout every part of the body, and is there decomposed, and the oxygen absorbed as its principal nourishment, similar to the decomposition of air in the pulmonary organs of what are called perfect animals.

The food of sponges must be similar to that of plants; for a Sponge has no more power to digest gross bodies, than a Fucus or a Conferva; and nothing can be more admirably adapted to a gaseous aliment than the construction of a sponge. The conformation of a sponge, better entitles it to the appellation of *sea-lungs*, than any other marine production; since the water absorbed by its capillary tubes becomes as greatly divided, as air respired by pulmonary organs; and thus by such an extensive surface offered to the water, decomposition may be effected in the same way as air is decomposed in the lungs of terrestrial animals.

Having advanced an opinion upon the constitution of sponge, it must be observed, that I have not enumerated what has been usually considered as fresh-water species of this genus, in my catalogue of British sponges, conceiving that they are actually of a different nature. Lamarck has separated these from *Spongia*, and has placed them in a new genus denominated *Cristatella*, which bears evident polypes. Bosc, however, conceives Lamarck has been deceived by a figure in Roesel, as he declares that he has examined a vast quantity of what is called *Spongia fluviatilis*, and never could discover animal organization with signs of life.

Not having had an opportunity of examining recent specimens of these fresh-water species of supposed sponges, I must confess that, by the structure alone in an *arid* state, I am led to an opinion that they do not truly belong to the genus Spongia *.

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* This fibrous brittle substance is evidently of animal origin, by its odour in combustion: the numerous minute globules it contains of the same figure and size, interspersed throughout the whole substance, have evident characters of *ova* connected together by glutinous filaments, which form the reticulated mass. If these minute globes were cells of polypes, or any other perfect animal, they would possess an aperture; whereas they have no opening. They are strong, tough, and polished within, like what the remains of a glareous matter would be when dried in

I shall now proceed to give a description of the several species of sponges that have been discovered to inhabit the British Islands.

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so small a body. It appears to me, that this substance is in fact the nidus of some aquatic insect, which may possibly congregate to deposite their eggs; and that the fibres, or threads that decussate each other, are attached to the *ova* for their security in mass, as we perceive in those of some spiders and other land insects.

SPONGIA

SPONGIA BRITANNICA.

In order to facilitate the arrangement of the species, I have divided them into the following families:

1. Branched; those which are properly branched, simple or compound.
2. Digitated; those which are divided into lobes or leaves, on their sides or on the summit.
3. Tubular; such as shoot into tubular processes, whether simple or compound.
4. Compact; such as are destitute of any divisions, and are of a compact form, but of indefinite shape, whether of an open or a solid texture.
5. Orbicular; such as are globose, with internal, radiating, asbestine spiculæ.

* Branched.

1. *Oculata.* Much branched, soft, the branches roundish and obtuse, furnished with marginal pores.

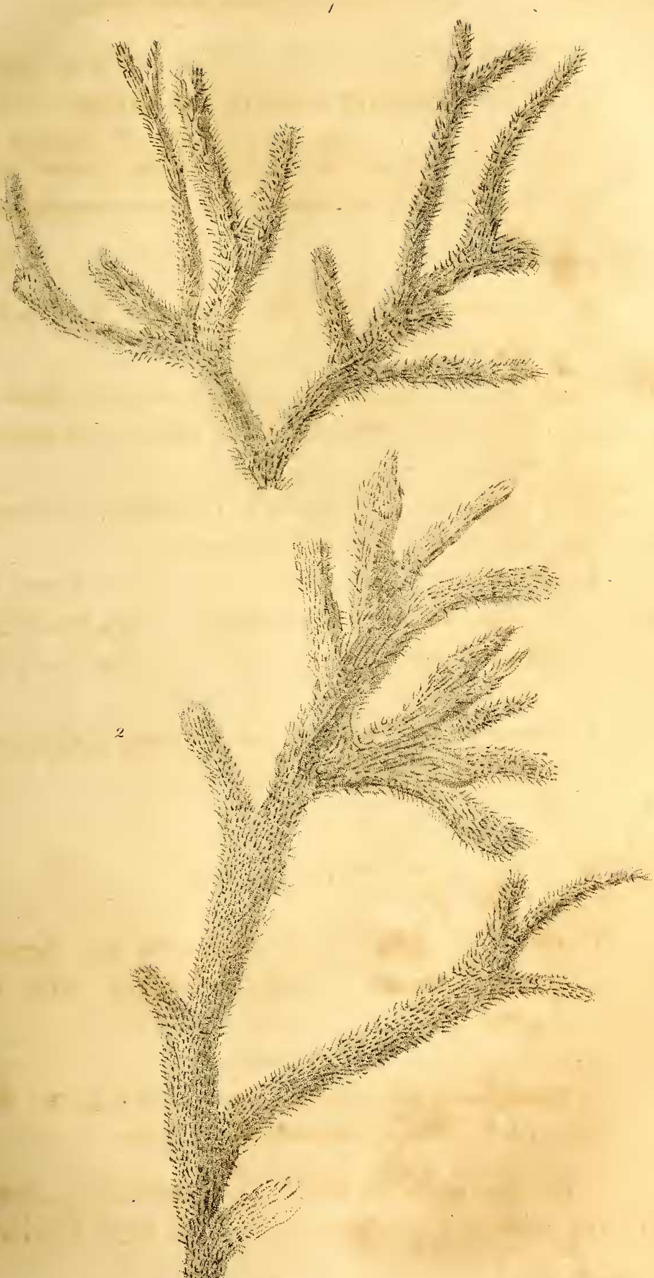
Plate vi. fig. 2.

Spongia oculata. *Ellis,* Coral. p. 80. t. 32. fig. F. f.—*Id.* Zooph. p. 390.—*Gmel.* p. 3820.

In all the specimens I have examined, some of the branches originate from the base, but have a

Wern. Mem. Vol. II. P. 78.

Plate III.



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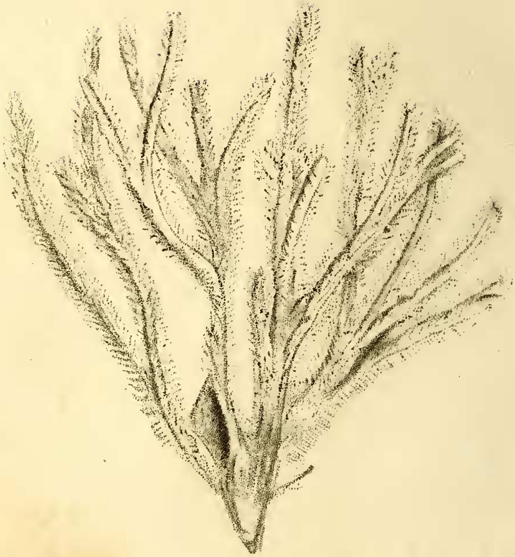
Wern. Mem. Vol. II. P. 79. *Plate IV*



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distinct stalk, which is composed of tougher materials, the fibres being ligneous and longitudinal. An elegant variety in my cabinet, is of a pale brown colour, with numerous divarications; some of these unite for an inch or more, and then separate, and spread at their tips into four or five small branches, with obtuse summits. The growth of this variety differs so much from the general appearance of *Spongia oculata*, that, were it not for the stalk, similarity of texture, and the marginal cells on the branches, it might have been considered a distinct species. The stem is destitute of branches for three inches; the branches are six inches long. This, and the common sort, are found on the coast of Devon.

2. *Stuposa.* With round branches of tow-like appearance, covered with pointed hairs.

Plate iii. fig. 1.—Plate iii. fig. 2. var.—Plate iv. var.

Spongia stuposa. *Ellis,* Zooph. p. 186.—Phil. Trans. 55. p. 288. t. 10. c.—*Gmel.* p. 3822.

What is considered as an elegant slender variety of this species, is beautifully white, and has the branches more ascending, and more tomentose. Perhaps it is the older specimens that become palmated at the divarications, like the antlers of a buck. Both these sponges may be likened to the horns of deer in their soft or velvety state, and one is probably the *Spongia cervicornis* of Pallas. If hereafter these should prove to be different species, the palmated kind might be called *damacornis*. Coast of Devon, rare.

3. *Palmata.* Palmated, with finger-like divisions on the margin, and little prominent pores irregularly disposed.

Spongia palmata. *Ellis,* Zooph. p. 189. t. 58. f. 6.—*Gmel.* p. 3822.

This, in some of its varieties, somewhat approaches *Spongia oculata,* is of a similar texture, but not so soft when dry, and the pores more numerous, and disposed all over the surface. Coast of Devon, rare.

4. *Coalita.* Much branched in an irregular and distorted manner, rather compressed, and of a brittle corky substance.

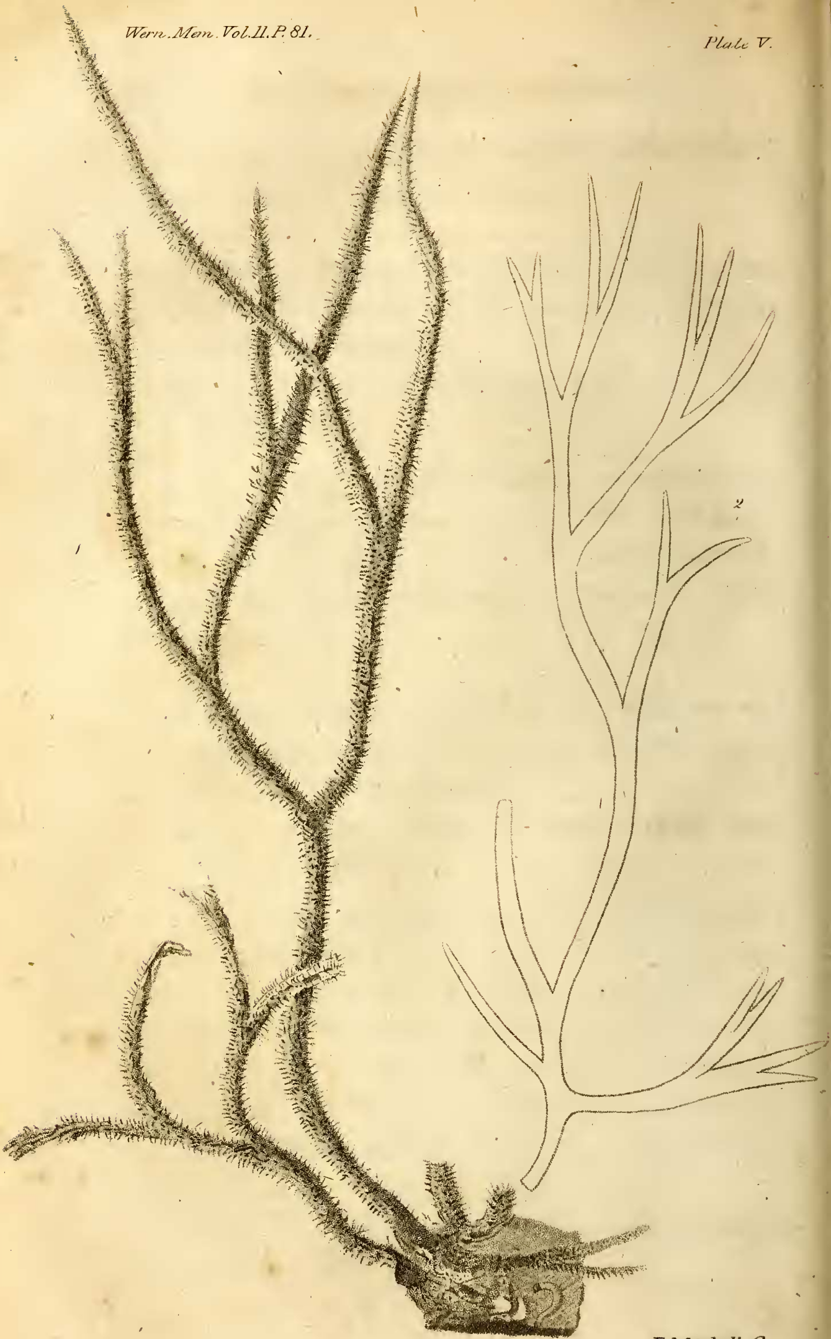
Spongia coalita. *Gmel.* p. 3825.—*Müll.* Zool. Dan. iii. t. 120.

This species is much branched, and composed of finely reticulated fibres, with seldom any larger pores: the stalk is scarcely larger than the branches, and both usually become sub-carinated at the sides, on which part a few porous tubercles are sometimes observed: the branches are frequently hooked, and turn in different directions, but preserve a flattish form. Coast of Devon, rare.

Müller is certainly mistaken in referring this to the *oculata* of Ellis.

Wern. Mem. Vol. II. P. 81.

Plate V.



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5. *Hispida.* With long, slender, round, dichotomous branches, covered with stiff hairs.

Plate v.

This slender branched sponge appears as if it sometimes grew horizontally on each side from the point of adhesion, which is very slight; in this case, both ends become branched. Others rise perpendicular from the base, which is attached to old shells; in some instances several stalks originate from the same spreading base, but are rarely connected: the branches are nearly round, except where they divaricate. Three, and sometimes four subdivisions take place in the larger specimens; the points of the subdivisions are subacute. Length, a foot or more.

When recent, contains a great deal of gelatinous flesh, and is of a yellowish-brown colour, becoming darker as it dries. The only specimens that have occurred, were taken off the coast of Devon by the trawl; rare.

The description given of *S. tupha*, would tolerably well accord with this, had not that species been stated to be soft, whereas this is hard, and not composed of so fine a texture as S. oculata, and is thickly muricated with hairs.

6. *Dichotoma*. Branched, erect, subcylindric, tomentose, and covered with small pores.

Spongia dichotoma. *Ellis*, Zooph. p. 187. 6.—Phil. Trans. 55. p. 289. t. 11. f. 1. (*Ellis.*) Lin. Syst. p. 1299.—*Berken.* p. 213.—*Gmel.* p. 3822.

Plate vi. fig. 1.

Brown, with long erect dichotomous straight branches, smaller at their summit: at the divarication of the branches it spreads a little, becoming compressed, but never so much as *S. oculata*; from which it also differs in the superior length and straightness of the branches; the texture is also more firm and less woolly. The *dichotoma*, like the *oculata*, originates from a compact ligneous stalk, an inch or two in length, but the branches are truly dichotomous, and they never terminate in more than a fork, and most frequently in a single point; whereas the *oculata* is much more complicated in its branches, which are more compressed, and sometimes inosculate, and their tips become digitated in older specimens; in some the ends are palmated, from which issue four or five fingers. In both these species, numerous branches arise together from the top of the main stalk: in the *dichotoma*, the first subdivision or offset from a main branch, commences close to the base, and another divarication takes place at the distance of two or three inches; but many of the main branches have only a lower divarication, and from thence extend nine or ten inches per-

Wern. Mem. Vol. II. P. 82. *Plate VI*

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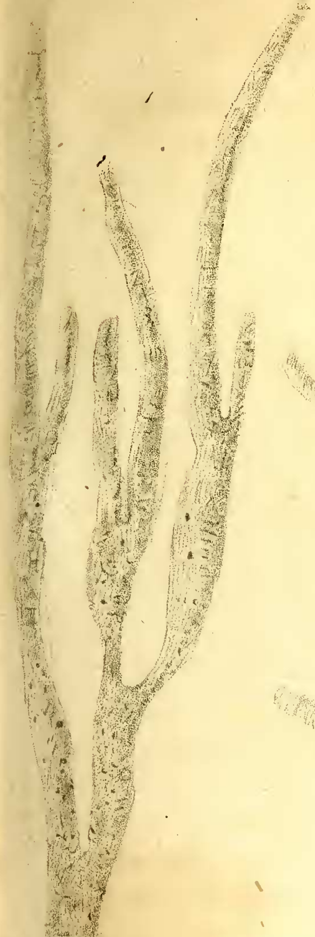

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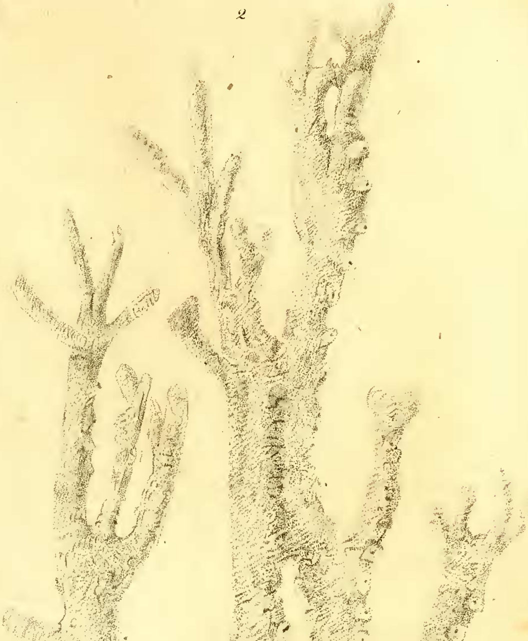

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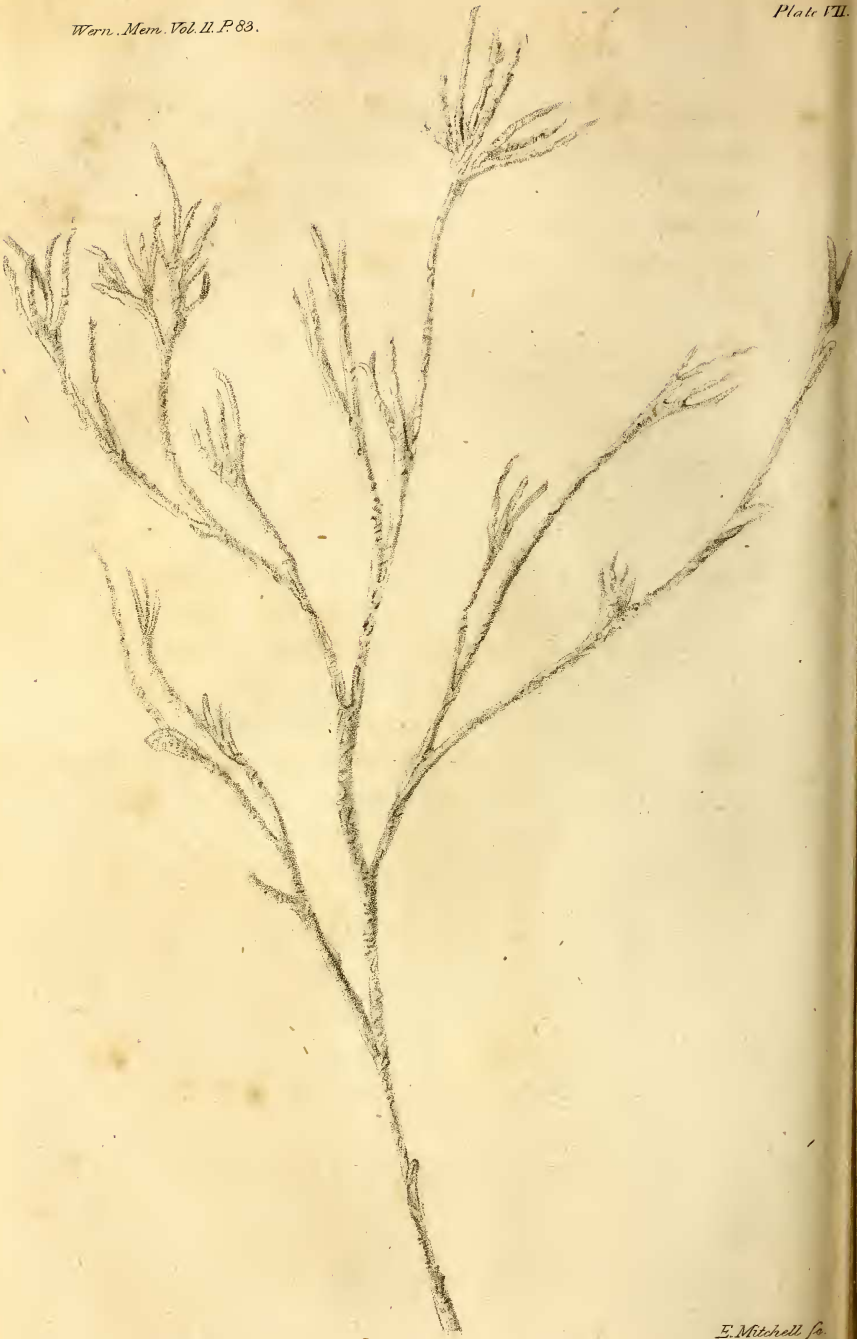

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fectly straight, and gradually tapering to a point. A specimen in my cabinet, taken on the coast of Devon, has not less than a dozen main branches, some of which are eleven inches long. A figure of a branch of this, and of the *oculata* *, are given together, in order to shew the difference of their usual growth, as it is probable they have sometimes been confounded.

A comparative description has been considered in some degree essential for the discrimination of these two species, as the *dichotoma* has not, I believe, been considered as British, but was originally described by Mr Ellis as a production of the coast of Norway. The rows of cells which the *oculata* is described to possess on the margin, and which project a little, does not form a character of distinction, being equally applicable to *dichotoma ;* but perhaps in this last, the cells are more disposed over the whole surface. Both species are yellowish when fresh.

Berkenhout is the only one who mentions this species as a native of the Cornish and Yorkshire coasts, but on what authority we are not informed.

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* Plate vi. fig. 2.

7. *Digitata.* With very slender dichotomous branches, digitated at their summit; the surface granulated.

Plate vii.

This very slender sponge is tough and flexible; neither the stem nor the branches are so large as a medium straw, slightly compressed: the branches are distant, and usually terminate in a cluster like the foot of a bird; these slender terminal divisions, are from three to six in number. It is compact in its texture, and when examined under a microscope, appears granulated on the surface, as if sprinkled with fine sand: the base of the stem is usually ferruginous, the rest of a pale yellow-brown.

Taken in deep water by the trawl off the coast of Devon; rare.

8. *Ramosa.* Palmated and digitated round the top.

Plate viii.

This curious sponge is stiff, and somewhat elastic; the interior part is ligneous, striated longitudinally, and which is always bare at the ends of the ramifications, where it seems to be composed of numerous fibres that frequently split and divide into fascicles: the spongy or exterior part is of a fine texture: colour pale yellow-brown.

This singular species, which appears to be undescribed, I first noticed in Mr Boyer's cabinet of British shells, chiefly found at Weymouth. I have since taken a larger and more perfect specimen on the coast of Devon, measuring nearly five inches in height.

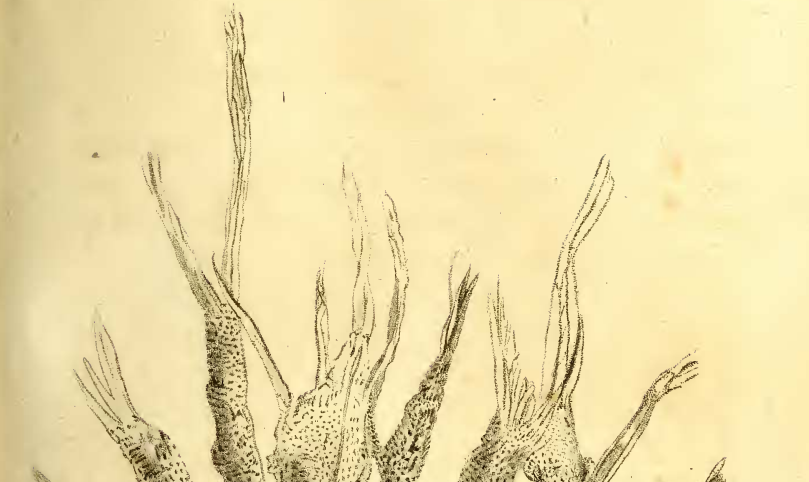

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Plate IX.

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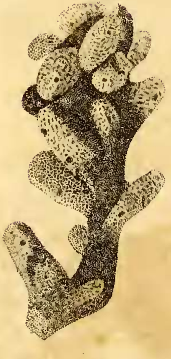

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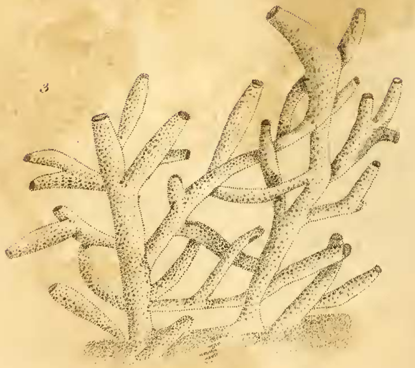

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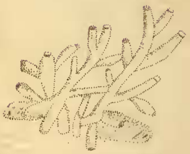

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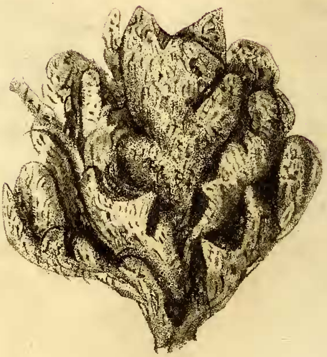

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** DIGITATED.

9. *Conus.* With numerous short flattish divarications issuing from the sides.

Plate x.

The divarications are irregular in size, shape, and situation, but they are usually compressed, short, and broadest at the end; these sometimes originate from an irregular stalk, giving a little resemblance to an expanded fir cone: the texture is rather coarse, and the outside furnished with spiculæ or short bristles. When dry it becomes stiff and rather hard, owing to the large quantity of gelatinous flesh which is obvious amongst the fibres. Colour when dry, of a dark yellowish-brown.

Coast of Devon; rare.

10. *Lobata.* With clustered ovate divarications.

Plate ix.

The texture of this sponge is rather more coarse than that of *oculata;* the lobes vary from ovate to oblong, and originate from an ill-defined stalk in an irregular manner; they are nearly connected, sometimes inosculate, and are furnished with a few prominent pores without order. Colour, yellowish-brown; height two inches.

Devon coast; rare.

11. *Perlevis.* Form indeterminate, texture close, surface covered with obtuse papillæ.

In texture, this sponge is somewhat similar to *tomentosa;* is equally light, but not so soft and crumbly, nor of so pale a colour; when fresh it is yellow, becoming of a light brown when dry: on the surface are numerous obtuse papillæ, the eighth of an inch in length; these are not tubular, but of the same texture as the rest of the sponge; some are clavated, others bifid or trifid, and compressed; sometimes a few moderate sized pores are scattered over the surface, very visible to the naked eye, being as large as if made by a common pin.

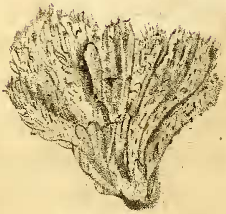
A specimen of about two inches long and an inch broad, taken on the coast of Devon, appears to have been attached to a rock its whole length.

12. *Aurea.* Broad, flat, and slightly divided at the top.

Two or three inches broad, and nearly two inches high, of an orange-yellow when fresh, fading to brown when dry. Sometimes its slight divisions are tubular, but this is of rare occurrence. It is not so much divided as *Spongia prolifera* of Ellis, or might be thought a variety; but in this, the base is always broad and compact, and the summit is more ragged than branched; it con-

Wern. Mem. Vol. II. P. 87. *Plate XI.*

1



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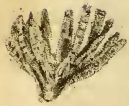

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tains a great deal of animal gluten, which in drying, contracts and connects the small divisions.

Plentiful in the estuary of Kingsbridge, covering the stones at low water.

13. *Rigida.* With obtuse, spreading irregular flattish divarications, arising from the same base; usually a short stalk.

Plate xi. fig. 1, 2.

This sponge is as coarse in texture as *Spongia officinalis,* and when fresh, is of an orange colour, which it partly retains if tolerably freed from the animal gluten: the divarications are irregular in size and shape, but usually originate from one base or stem. When dried, it becomes rigid, but less so when it has been exposed for some time on the sea-shore, or, by repeated irrigation, the animal gluten is decomposed and washed out.

Height, about an inch.

What is conceived to be a small variety, has the divarications more numerous and distinct, spreading from a short pedicle. In this, the reticular fibres are greatly obliterated by the large quantity of gelatine retained, by the contraction of which, the fibres are connected, and the sponge is rendered hard and destitute of flexibility.

Coast of Devon; rare.

*** Tubular.

14. *Coronata.* A single tube, the summit crowned with radiating spines.

Spongia coronata. *Ellis,* Zooph. p. 190. t. 58. f. 8, 9. —*Gmel.* p. 3819.

This curious little sponge, originally discovered by Mr Ellis in the harbour of Emsworth, is not uncommon on many parts of the British coast; I have found it in the most southern extremity, and have been favoured with it from Zetland by Mr Fleming. The specimen figured by Ellis, is very diminutive; it is usually larger, and one in my cabinet is above an inch in length, but not near so large in proportion as the magnified figure in the *Zoophytes.* It should be remarked, that the specific character of being "surrounded at top by a crown of spines," is rarely identified; but the spiculæ that cover all other parts, form a lasting character. It is generally of a yellowish colour, sometimes of a shining silvery white; and this we may conceive is its true colour, could all adventitious matter be removed.

Found on fuci and other marine bodies.

15. *Botryoides.* Minute, ovate, tubular, in bunches, covered with triradiated spines.

Spongia botryoides. *Ellis,* Zooph. p. 190. t. 58. f. 1.-4.—*Gmel.* p. 3823.

This species, originally described by Mr Ellis, is the only one I have not been able to identify amongst the sponges that zoophytist has given as British. It is very minute, and composed of branches of little oval figures in the shape of grapes, and each is open at the top, (probably tubular.) "When the surface of this species is highly magnified, it seems," says Mr Ellis, "as if covered with little masses of triple equidistant shining spines." These spines were described and figured by Walker in *Testacea Minuta Rariora,* as a minute species of *Asterias.* My late valuable friend Mr Boys of Sandwich, favoured me with specimens of these triple spines, together with most of Walker's minute shells, and they were admitted by that able naturalist to be the spines of *Spongia botryoides.* I do not recollect that Mr Boys had ever seen a perfect specimen of this sponge, nor is it mentioned in his Catalogue of subjects in Natural History in the neighbourhood of Sandwich; but Mr Walker says his *Asterias triradiata* is found on all the shores of Kent; so that we may conclude the sponge is not uncommon in that quarter.

16. *Papillaris.* Sessile, flat, spreading, with scattered tubulous tubercles.

Spongia papillaris. *Gmel.* p. 3824.—*Pallas,* Zooph. p. 391.—S. compacta, Br. Miscel. 1. t. 42 ?

This sponge is usually attached to rocks, sometimes intermixed with *Corallina officinalis* and others, spreading three or four inches. In a recent state, it is soft and yellow, the tubercles occasionally tipped with blue : when dry it becomes less soft, and turns to a brown or grey colour. When examined by a lens, the surface appears like gauze : the papillæ are various in size, hollow or tubular, and disposed without order.

Common on the south coast of Devon on the rocks that are rarely left by the receding tide.

It will be perceived, that part of the synonyma prefixed, is given with doubt ; but we suspect from the appearance of the *compacta* figured by Mr Sowerby, that it is really a fine variety of this species ; the surface appears to be the same, and the difference consists in the tubercles being more lengthened, more numerous, and more connected. This fine variety, (as I suspect,) was probably thrown up from the deep, where all marine subjects of this nature, arrive at much greater perfection than nearer the shore, where the continual agitation of the water causes depauperation.

17. *Tubulosa.* Tubular, branched, tough; the tubes erect, and slightly tapering.

Spongia tubulosa. *Ellis*, Zooph. p. 188. t. 58. f. 7.—Lin. Syst. p. 1297.—*Gmel.* p. 3819.—Spongia fastigiata. *Pallas*, Zooph. p. 392.

The external structure of this sponge is so fine as not to be discerned by the naked eye; smooth, and destitute of any detached fibres; when examined by a lens, it is observed to be finely, though irregularly reticulated with smooth fibres: the tubes are hollow throughout, nearly erect, and most commonly originate from a common base, but frequently so close together, as to become more or less united; sometimes smaller tubes issue from the sides of the larger: at the summit the tubes are as thin as paper.

This sponge is not uncommon in the estuary of Kingsbridge at very low water, adhering to stones, and is occasionally taken by the trawl in the open sea on the coast of Devon. It rarely exceeds three inches in height, and four or five inches wide; one specimen contains ten principal tubes of different lengths: the colour when fresh is yellow, but, by drying, it becomes of a pale brown or dirty white.

Making allowance for climate, this approaches so nearly to the Batavian tubular sponge, that I have ventured to consider it a depauperated variety of the species described by Mr Ellis, rather than run a risk of unnecessarily multiplying species without evident specific distinction.

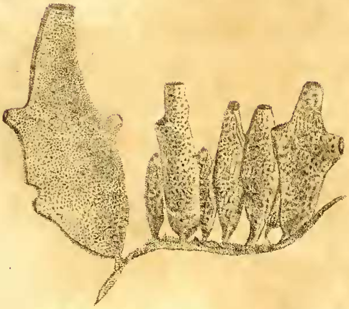
18. *Foliacea.* Of a fine texture, greatly compressed, and tubular; the inside finely reticulated.

Spongia compressa. *Fab.* Faun. Groenl. p. 448 ?—*Gmel.* p. 3825 ?

Plate xii.

This leaf-like sponge usually grows in clusters, each follicle being of an irregular shape, but generally more or less obovate, furnished with a short pedicle, by which it is affixed; and the apex is contracted, having an opening to the tube: some specimens have one or two perforated tubercles on the lateral margin; others shoot into small lateral leaflets, which are also tubular.

The remarkable character of this sponge, is that of being so thin or compressed, as at first sight to be mistaken for a fine *Flustra*, and yet being hollow. Its colour is dull yellow when alive, and in that state, when adhering to the under part of projecting rocks, has so much the appearance of a young *Flustra foliacea*, that it might readily deceive an experienced eye without close inspection. It rarely exceeds an inch in length, and is of a fine texture. It is frequently mixed with stunted fuci, growing in the most exposed situations, subject to the severest agitation of the waves, and is always observed to be pendent.



E. Mitchell ſc.

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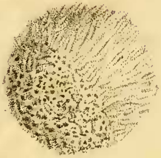

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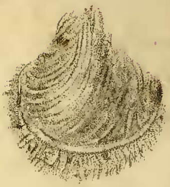

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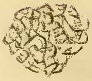

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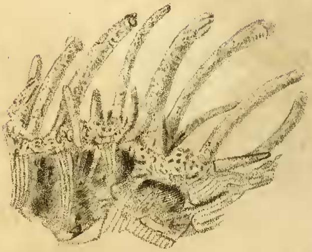

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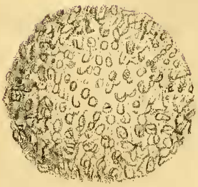

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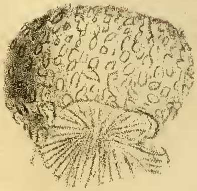

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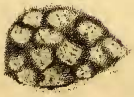

E. Mitchell sc.

The only place I have noticed this sponge, is at Dawlish in Devonshire. This is probably *Spongia compressa* of Fabricius? which is mentioned as a production of the Scotish coast in Professor Jameson's catalogue of Vermes, given in the first volume of the Wernerian Natural History Memoirs.

The Reverend Mr Fleming favoured me with a very fine specimen on a fucus from Zetland, under the denomination of *Spongia compressa.* The interior surface of this tubular sponge, is elegantly reticulated, having the pores larger than on the outside; and, when highly magnified, is found to be formed of aggregate, simple spiculæ.

19. *Penicillus.* With a yellowish gelatinous base, supported by internal spiculæ, and bearing on its surface erect, white, flexible, spongy tubes.

Plate xiii. fig. 7.

This is an interesting species of Spongia, as its internal conformation appears clearly to demonstrate its great affinity to *Alcyonium lyncurium* and *cydonium* of Linnæus; while its exterior part is evidently that of a tubular sponge. It must be confessed that I had long considered those *Alcyonia*, as more properly belonging to this genus; but as the asbestine spiculæ with which their interior part is crowded, and the firm fleshy appearance of the exterior part, differed somewhat from the generality of Spongiæ; and as no radiating pores or polypi could ever be discovered, it was in contemplation to form them, and one or two others, into a distinct genus. The discovery of this new species of Spongia, induces me to recall my assent to the formation of a new genus for those obscure species originally considered by Linnæus as Alcyonia: but by removing them into this genus, we shall follow the course of nature, and accord with the opinion of that great zoophytist Mr Ellis. This high authority has, in a few words, defined the leading characters of the *Alcyonium* and *Spongia*, and pointed out their distinction. Speaking of *Alcyonium* in his introduction to *Spongia*, " These polype suckers," says this naturalist, " are the distinguishing characters of that genus, as much as the pores without the polypes in these elastic fibrous bodies, is the character of sponges." With this strongly marked character, stamped by so able and experienced a zoophytist, we cannot hesitate to remove those of the fibrous kind destitute of polypes from *Alcyonium* to *Spongia*; and if ever Mr Ellis himself had the smallest doubts upon the subject, such would have been removed by the examination of *Spongia penicillus*.

The interior substance of this species, is precisely that of *Lyncurium*, but instead of being orbicular, it spreads horizontally upon marine bodies, and shoots upwards from its surface cylindric tubes of nearly an inch in length, which have an opening at the apex ; these tubes are distant, and not disposed in regular order, nor of any determinate size ; but on the same specimen may be observed tubes from the eighth of an inch upwards, in all gradations, to the length before mentioned. In drying, the tubes become compressed and a little arcuated, and all incline the same way ; they are flexible, tough, and the texture extremely fine. The spiculæ that support the fleshy part, appear to be the base or continuation of the tubes ; perhaps these are ligaments, and may contribute to give some small action to the tubes, by inclining them to either side, or by expansion and contraction. When first separated from the rocks, the asbestine-like spiculæ are not so obvious as when the flesh is contracted by drying. In its general appearance, this sponge bears some resemblance to Lichen filiformis.

The only specimen was taken by dredging, and is an inch and a half in length.

20. *Lævigata.* Soft, compressible, and elastic ; texture extremely fine and reticulated.

Plate xvi. fig. 4.

This is the most delicate of all the soft British sponges ; when compared with either *oculata* or *dichotoma*, their texture is extremely coarse ; by the naked eye, the surface appears nearly smooth, or finely frosted ; when examined with the double lens of a megalascope, the surface is found to be minutely and elegantly reticulated, and of a cottony softness, but the fibres are infinitely finer than common cotton. Perhaps the texture in fineness would be more aptly compared to the interior spongy part of some species of puff-ball (Lycoperdon.)

The only small piece of this sponge that has come under observation, is tubular throughout; whether this is its natural habit, or the consequence of being a parasitical species that surrounds the stalks of fuci, or other marine plants, has not been discovered; but it is observable, that the central fibres radiate to the circumference; the summit, however, is rounded and perfect, like the finish of an independent species.

Imperfect as the specimen is from which this description is taken, it is distinct from any I am acquainted with, and therefore cannot be omitted. Till its habit is better known, it has been thought proper to place it amongst the tubular sponges.

21. *Ananas.* Ovate, rugous, tubular, the summit crowned with spines surrounding the aperture.

Plate xvi. fig. 1, 2.

This elegant minute sponge, is nearly allied to *coronota*, but is very different in shape and texture; the surface is not covered with spiculæ as in that species, but is apparently vesicular or scaly, and when magnified, somewhat resembles an extremely fine *Millepora,* except that no openings or pores are visible, nor is it of the same consistence.

The size is expressed in the figure referred to, as also its appearance when magnified.

Devon coast; rare.

Var.? With this, a figure is given of a white tomentose tubular sponge, which is suspected to be the same species in a more perfect state; should it hereafter prove so, the leading characters may require revising. It is affixed to *Cellaria scruposa,* as represented at fig. 3., highly magnified. The shape is sufficient to separate it from *Spongia coronata,* which is invariably subcylindrical.

22. *Complicata.* Tubular, with numerous branches, most complicately interwoven, and frequently inosculating.

Plate ix. fig. 2, 3.

This species is minute, of a very fine texture, and, when dry, is observed to be formed of shining white spiculæ. It is tubular throughout, and the branches are subcylindric, with an opening at the apex, and are frequently bifid, and sometimes trifid: the principal stems originating from distinct bases, throw out lateral branches that anastomose with each other, and then a most complicated communication is obtained throughout a large cluster. When bruised and reduced to fine powder, and the particles highly magnified, many triradiated spines are observable. This circumstance might favour an opinion, that the present subject is only a variety of *Spongia botryoides.* Mr Ellis, who first discovered that species, remarks, that when that sponge is examined under a microscope, the whole surface is observed to be covered with triradiated spiculæ. I could not discover any such superficial spines in *Spongia complicata;* and those triradiated spines which were observed, are not a quarter so large as those belonging to *botryoides.* It must be confessed, that I have never been able to procure *botryoides,* although I am in possession of its triradiated spiculæ, originally sent to me by my late worthy friend Mr Boys, for the minute *Asterias* figured by Walker. If, however, an opinion may be formed from the representation of *botryoides* in Ellis's Zoophytes, there appears to be a very considerable distinction between the two species: that is a cluster of little oval figures occasionally branched, but all its parts retaining an ovate form, and nothing either in description or figure, represents the complicated cylindrical, and frequently inosculating tubes which characterise *complicata.*

This elegant little sponge was found in Zetland by Mr Fleming, adhering to fuci, to whom I am under obligations for a clustered specimen, containing innumerable principal stalks, all more or less uniting in the manner the two here selected are represented.

**** COMPACT.

23. *Tomentosa.* Irregular, soft, brittle, and full of pores interwoven with minute spines.

Spongia tomentosa. Lin. Syst. p. 1299.—*Gmel.* p. 3821.
Spongia urens. *Ellis,* Zooph. p. 187.
Sponge like crumb of bread. *Ellis,* Coral. p. 80. t. 16. f. d. d. 1. D. 1.—Phil. Trans. 55. p. 288. t. 10. f. A.
Spongia panicea. *Pallas,* Zooph. p. 308.—*Gmel.* p. 3823.—*Turt.* 4. p. 660.

This species of sponge is so amply described by Mr Ellis, that little needs to be said of it; but it may be proper to remark, that the minute spines of which it is formed, and which are said to sting and blister the skin like cow-itch, is not readily discovered except in the larger pores; nor do they always affect the hand by which the sponge is rubbed, for it is only in a very dry state that such an effect is obvious; hence, as Mr Ellis remarks, the property of stinging, is much increased by drying in an oven.

It is suspected that this sponge has been commonly confounded with *Spongia suberia,* though in fact not the least like when compared, either in colour, (when dry,) or in texture; a definitive comparison will be found in the description of *suberia.*

Tomentosa is sometimes thrown ashore on the coast of Devon, and is occasionally found adhering to the roots of the larger fuci. When recent, it is of an orange colour, and soft; when exposed for some time, it becomes white, extremely light and brittle; and when broken, is porous, " in appearance," says Mr Ellis, " like the crumb or soft part of bread."

It will be observed, that *panicea* has been given in a modern work as a British species, distinct from *tomentosa*, perhaps copied from Turton's Gmelin. The reference, however, of Pallas, to the species in Ellis, is the best guide. It may be proper to remark, that the outside of this sponge is very different in appearance from the inside; it is smooth, and when examined by a lens, some parts are found to be finely reticulated like gauze. It is only in the fractured parts that the bread-like appearance is observed.

24. *Suberia.* Crustaceous, compact, tough, without visible pores externally.

This sponge is of a corky nature, resembling the close texture of the stalk of some species of Boleta. It has rarely any other pores than what are formed by the fibres, which are so extremely fine, as not to be visible to the naked eye, even when broken; and with the assistance of a pocket lens, they are not definable on the surface. Its colour is orange-yellow when fresh, becoming